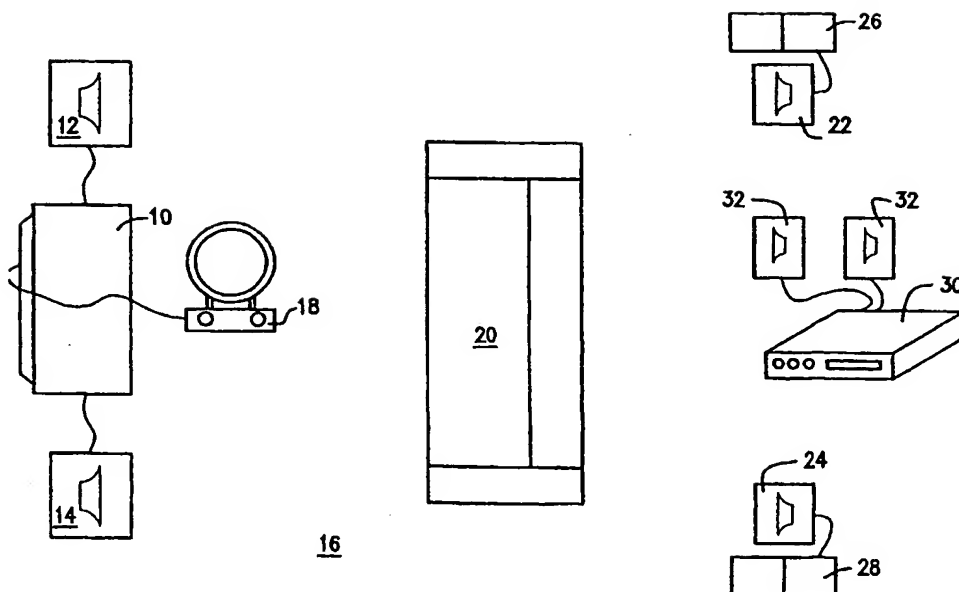




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04R 5/00	A1	(11) International Publication Number: WO 00/41438 (43) International Publication Date: 13 July 2000 (13.07.00)
(21) International Application Number: PCT/US00/00148 (22) International Filing Date: 5 January 2000 (05.01.00) (30) Priority Data: 09/225,946 6 January 1999 (06.01.99) US (71) Applicant (for all designated States except US): RECOTON CORPORATION [US/US]; 2950 Lake Emma Road, Lake Mary, FL 32746 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): McGREEVY, William [US/US]; 422 Devon Place, Heathrow, FL 32746 (US). CARION, Brian, G. [US/US]; 1221 Thunder Trail, Maitland, FL 32751 (US). (74) Agents: BERGER, Peter, L. et al.; Levisohn, Lerner, Berger & Langsam, Suite 2400, 757 Third Avenue, New York, NY 10017 (US).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: REAR CHANNEL HOME THEATER WIRELESS SPEAKER SYSTEM



(57) Abstract

A local wireless magnetic coupling transmission system is provided transmitting audio information from a television (10) to rear channel speakers (22, 24) which are located in the rear of a room in which home theater is being provided. The system provides automatic shut off to conserve battery power, and portable battery means may be provided enabling the rear channel speakers (22, 24) to be easily and conveniently located to maximize the home theater sound effect.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

REAR CHANNEL HOME THEATER WIRELESS SPEAKER SYSTEM

This invention relates to an improved system for transmitting audio signals to a rear channel speaker used in home theater systems.

The advent of home theater systems has been greeted with great acceptance by the consumer public. In this regard, home theater systems include the use of speakers arranged around a room to provide the home theater experience. In particular, and as one aspect of the home theater experience, there is a need for rear speaker sound. As may be understood, rear speaker sound is achievable, but hard wiring is conventionally used. Hard wiring is unattractive, generally undesirable to many people and should, preferably, be avoided if possible.

The assignee of this invention, Recoton Corporation, owns a number of patents relating to 900 MHz technology. The 900 MHz technology generally relates to RF 900 MHz signals allowing for a transmitter and remote wireless receivers to be separated by up to 150 feet. Sometimes, at 900 MHz transmission frequencies, interference can occur due to use of other appliances such as telephones and the like which may receive or transmit at substantially similar or close frequencies. As a consequence, it is desirable to provide wireless rear channel speakers without utilizing RF transmission in the 900MHz range.

An object of this invention is to provide a rear channel wireless speaker system employing a transmission system in which there is little if any chance of

interference.

Another object of this invention is to provide such a rear channel wireless speaker system which is easy to assembly, inexpensive and very reliable.

Yet another object of this invention is to provide such a rear channel speaker system in which the power for the rear channel speaker can be self contained, either being rechargeable batteries, conventional batteries or a plug-in AC/DC converter.

Yet another object of this invention is to provide such a rear channel wireless system which will be easy to mount, attractive in appearance and susceptible to easy use.

Other objects, advantages and features of this invention will become more apparent from the following description.

SUMMARY OF THE INVENTION

In accordance with the principles of this invention, the above objects are accomplished by providing a magnetic induction local area wireless transmission system in which magnetic induction is provided to transmit the audio signal from a television to the rear channel speaker. Magnetic induction system has limited ranges for transmitting audio signals, but magnetic induction systems can be designed to operate within FCC regulations and provide reasonably effective transmission for distances up to 25 feet. Such a range is acceptable and utilizable for rear channel home theater speaker systems because the distance between the television and receiver for the rear channel is rarely greater than 25 feet, and in

most cases, is less than 15 feet.

In order to prolong the life of battery power utilized with the present invention, when there is no signal present being transmitted, the receiver's power is turned off. So long as there is no signal present, the power will not be turned on, but the receiver may be provided with a signal to determine whether or not there is a transmitted signal. When there is a transmitted signal, it will automatically reactivate the battery circuitry to cause the receiver circuit to be able to receive transmitted information.

The present invention intends to utilize a chip set provided by a company identified as AURA Corp. Additionally, U.S. Patent 5,771,438 issued June 23, 1998 to Palermo et al describes a conventional magnetic system with transmitter electronics and receivers shown therein. Insofar as conventional magnetic transmitter electronics and receivers are employed, the '438 patent is illustrative of a prior art system which can be employed in the present invention.

DESCRIPTION OF THE DRAWING

Fig. 1 is a block diagram is a block diagram of the present invention employed in a home theater system in which the magnetic transmission system is used for rear channel speakers.

DETAILED DESCRIPTION

A television 10 having its normal complement of adjacent speakers 12 and 14 is located at the front of a room 16. The audio output emanating from the television is connected to a magnetic transmitter 18 substantially as described in U.S. Patent 5,771,438. The listener is located in front of the

television as at a couch or a chair 20, and a pair of rear channel speakers are located behind or at the rear sides of the room as at 22 and 24. Each of the rear speakers is connected to a shelf-like assembly easily mounted on the wall, with the shelf-like assembly including therein the wireless magnetic receiver 26, 28. The details of the wireless magnetic receiver are identified in U.S. Patent 5,771,438

An alternative embodiment includes a single receiver 30 connected to a pair of speakers 32.

The transmitter includes a view meter identifying the level of power emanating therefrom. The rear receivers operate with battery power wherein the battery is either rechargeable or not, or the DC power can be provided by an AC/DC converter connected into a standard outlet. Preferably, the speakers are powered solely by batteries which enable the rear channel speakers to be easily mounted to a wall anywhere in the rear of the room without the need for power outlets.

As a feature of the present invention, the receivers automatically turn on or off depending upon the presence of a transmitted signal. Further, the transmitter receiver system includes full diversity and channelization with up to eight channels.

The present invention provides a highly efficient magnetic coupling circuit for rear channel home theater utilization in which the audio signal emanating from the TV is transmitted through the magnetic transmission system to the rear channel speaker employing the magnetic receiver so as to produce audio within

the home theater environment. By providing portable battery power, the speakers may be placed in any desired location so as to emphasize and maximize the effect of the home theater effect. Further, by employing magnetic induction, interference which might be present if RF wireless transmission is eliminated, and the magnetic transmission is highly stable thereby providing excellent and reliable rear channel sound.

While this invention has been described with respect to particular applications, it will be appreciated that the described home theater system may be used for other purposes. Many other variations and applications of the invention will be apparent. The above specification and the detailed description of the preferred embodiment are to be considered as representative only, as the scope of the invention is intended to be covered by the scope of the claims, as interpreted by the courts, and their reasonable and legal equivalents, as also interpreted by the Courts and the applicable statutes.

WHAT IS CLAIMED IS:

1. A wireless transmission system comprising a magnetic transmitter connected to an audio source, said magnetic transmitter transmitting a magnetic signal carrying said audio signal, a magnetic receiver receiving the audio signal transmitted by the magnetic transmitter, an audio speaker connected to said magnetic receiver to produce said audio signal, the audio source producing an audio signal transmitted to said rear channel speakers, said rear channel speakers being located a sufficient distance from the source of the audio signal to provide rear channel sound, the transmission frequency of said magnetic transmitter materially eliminating unwanted interference.
2. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said receiver comprises battery power.
3. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said battery power comprises a rechargeable battery.
4. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said battery power is provided by an AC/DC converter connected to said receiver.

5. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said receiver comprises means to terminate its operation automatically.
6. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said receiver comprises means to automatically turn on and turn off the receiver in response to the presence or absence of a signal being transmitted.
7. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said receiver may operate in a sleep mode in which de minimis power is drained in said sleep mode.
8. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said transmitter comprises a view meter identifying the level of power transmitted.
9. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 2, wherein said transmitter comprises a view meter identifying the level of power transmitted.
10. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 1, wherein said transmitter and said receiver each comprise a chip set.

11. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 11, wherein said chip set comprises channelization for up to eight channels.
12. A wireless transmission system comprising a magnetic transmitter connected to an audio source according to claim 11, wherein said chip set comprises substantial diversity to be able to enable said receiver to be connected to multiple antennas so as to select the strongest signal for receipt.

1/1

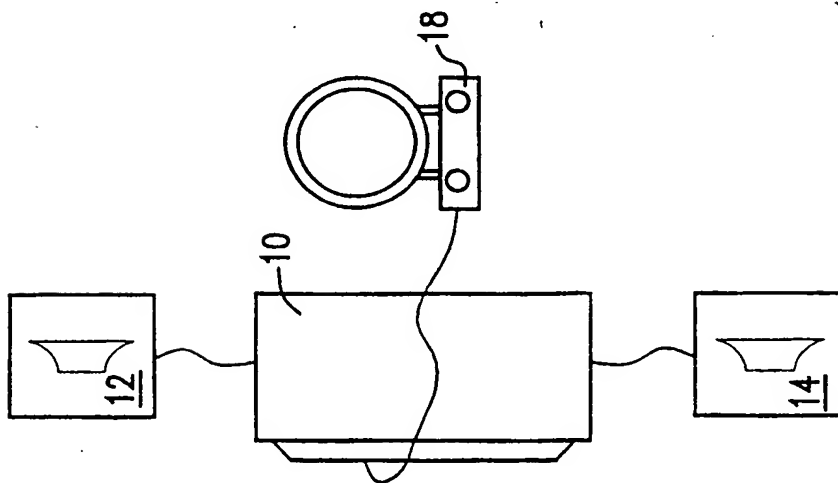
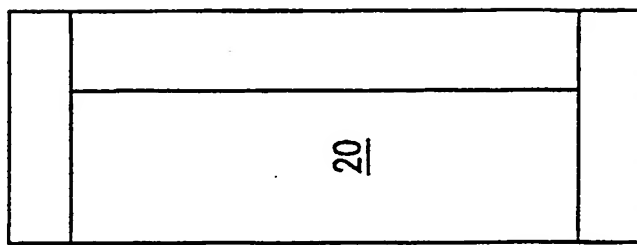
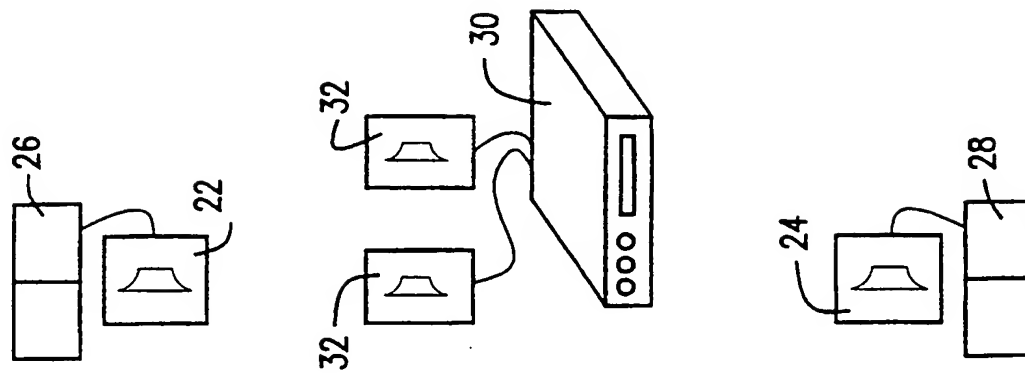


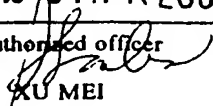
FIG. 1

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/00148

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) :H04R 5/00 US CL :381/17, 307, 77 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 381/17, 18, 300, 307, 55, 58, 59, 77, 79, 332, 334, 111, 123, 189, 124; 455/41, 66 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched None Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Extra Sheet.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,708,719, A (GREENBERGER et al) 13 January 1998, see entire document.	1-7
Y	US 4,899,388 A (MLODZIKOWSKI et al) 06 February 1990, see entire document.	1-7
Y	US 5,771,438 A (PALERMO et al) 23 June 1998, see entire document.	1-7
A	US 5,666,422 A (HARRISON et al) 09 September 1997, see entire document.	1-12
A	US 5,737,427 A (AMBOURN) 07 April 1998, see entire document.	1-12
A	US 5,768,399 A (STATHAM et al) 16 June 1998, see entire document.	1-12
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* "A" "B" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier document published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
Date of the actual completion of the international search 22 MARCH 2000		Date of mailing of the international search report 26 APR 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer  XU MEI Telephone No. (703) 308-6610

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/00148

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,568,516 A (STROHALLEN et al) 22 October 1996, see entire document.	1-12

Form PCT/ISA/210 (continuation of second sheet) (July 1998)★

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/00148

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

NPL, WEST

search terms: rear/back/surround speaker/loudspeaker, wireless transmitter/receiver, auto power shut off, battery/power saving, sleep mode, transmitter view meter.